

BY ELECTRONIC MAIL

May 1, 2023

Jonathan Evans, Presiding Officer
Subcommittee, New Hampshire Site Evaluation Committee
21 Fruit Street, Suite 10
Concord, New Hampshire 03301

Re: Docket No. 2021-02: HMMH Antrim Wind Compliance Monitoring Report

Dear Mr. Evans and honorable subcommittee members:

Thank you for the opportunity to comment on the HMMH technical report that summarizes the sound compliance monitoring conducted at the Antrim Wind facility.

SUMMARY OF REVIEW

It appears HMMH misunderstood the objective for the sound survey, which was complaint investigation and validation. There was no apparent effort by HMMH to adhere to the requirements of NH Site 301.14(f)(2) or NH Site 301.18(i). Monitoring locations were changed, removed, and added throughout the measurement periods. In most cases the monitors were situated a mile or more from any of the turbines, which exceeds the distances at which complaints were filed. At one location (NH DOT) HMMH determined that the measurements provided limited or no value due to contamination from other sound sources yet retained the results in the report without explanation. During most of the measurement periods, the turbines were operating well below their generating capacity.

HMMH makes several claims in its report that are contradicted by its own data.

HMMH wrongly states in its conclusion that no $L_{eq}(5\text{-minute})$ or $L_{eq}(elapsed\ time)$ measurements matched or exceeded the 40 dBA nighttime limit. This limit was exceeded at the Reed Carr Road monitor on June 9. HMMH's also incorrectly claims the turbines were operating and audible during all reported measurement periods. There were clearly two periods on June 30 when the turbines were not operating. Measurements during these periods show the continuous background level (L_{90}) of around 26 dBA. This level is consistent with testimony and field measurements by Antrim Wind's expert, Robert O'Neal, who reported the L_{90} at the project site as low as in the mid-teens.¹ HMMH measurements after transient sound levels were removed clearly show the turbines were producing sound levels that were dominant i.e. at least 10 dB over the L_{90} . (see also ANSI/ASA S12.9-2013/Part 3 at 3.6 and 6.9)

When evaluated in the context of a post-construction sound compliance test, HMMH's report provides useful information about the sound emitted from the Antrim facility. HMMH's data show that the turbines are producing sound levels that materially exceed Antrim Wind's 2016 preconstruction predictions and do so under less than worst case conditions. Notably, the Reed Carr Road and Salmon Brook Road monitor

¹ Antrim Wind Energy Project Sound Level Assessment Report, 2/17/2016. https://www.nhsec.nh.gov/projects/2015-02/application/documents/2015-02_2016-02-19_att09_updated_noise_rpt.pdf

locations show decibel readings over 41 dBA and 39 dBA respectively, when these locations were predicted to have maximum worst-case operational levels of 34-35 dBA.²

HMMH's conclusion that its monitoring shows consistent compliance with the NH SEC noise limit is not supported by its own data.

NH SEC NOISE STANDARD

The subcommittee was tasked, in part, with recommending to the full NH Site Evaluation Committee the "appropriate methodologies for measurement and analysis of sound" as it pertained to wind turbine noise. After an investigation into the existing rules and after hearing from interested parties, the subcommittee's written recommendation³ was filed with, and unanimously adopted⁴ by the full Committee on March 9, 2022. The language adopted by the Committee is as follows:

- The Noise Limit in Site 301.14(f)(2)(a) limits Antrim Wind's sound emissions to the greater of (i) 40 dBA at night/45 dBA during the day, or (ii) 5 dBA above background levels (measured using the L90 statistic). Thus, Antrim Wind's sound emissions may go above 40 dBA night/45 dBA day if the background sound levels are sufficiently loud (i.e., greater than 35 dBA at night, or 40 dBA during the day).
- Measurements of Antrim Wind's sound emissions and background sound shall be conducted according to the ANSI Standard.
- Antrim Wind's sound emissions shall be measured using LAeq over the time period required by the relevant ANSI Standard. That is at least five minutes for accelerated measurements and a longer period if ANSI's basic procedure is utilized, as reasonably determined by the professional conducting the study.

A central aspect of the adopted methodology is that the time interval, t , over which equivalent sound levels (L_{eq}) are determined is not fixed in the rule. Rather, the time interval is determined by the individual conducting the test, with a minimum interval of 5-minutes.

DISCUSSION

1. HMMH methodology. It appears HMMH generally followed ANSI/ASA S12.9-2013/Part 3 in positioning its monitors and collecting sound data including audio recordings of the acoustic environment. The report omits the latitude and longitude of the monitor sites and provides no photographic evidence of the monitor locations relative to the turbines. Table 4 which lists the approximate distances between the noise monitoring locations and each turbine is useful, but there is no way to validate whether the monitors have a direct line-of-sight to any of the turbines.

According to the report, HMMH followed the ANSI-prescribed procedure for excluding transient background sounds and isolating the sound under test. There is no information to suggest HMMH made a priori assumptions about the characteristics of the turbine noise or inappropriately excluded

² *Id*

³ Subcommittee's Recommendation to the Site Evaluation Committee Concerning Charge 1, 8/23/2021 at 1.

⁴ Draft Minutes of March 9, 2022 Public Meeting in SEC 2021-02 at 3.

turbine-only sound data from its data collection or analysis.⁵ Filtering for high-frequency biogenic sounds including birds, insects, and frogs was inconsistently applied, even at the same monitor locations. Such filtering should have been applied consistently across all data.

HMMH states that its data analysis included processing of 1-second and 0.1-second data streams but does not clarify which data set was used to compute the $L_{eq}(t)$ results. One-tenth second data is prescribed in both ANSI and NH Site 301.18(e)(6).

Consistent with the NH rule, HMMH reported various L_{eq} values including $L_{eq}(5\text{-minute})$ and $L_{eq}(\text{elapsed time})$.

2. HMMH study does not comply with NH Site 301.18(i). The objective of the HMMH field study was to investigate and validate noise complaints arising from turbine operations.⁶ Validation of noise complaints is specifically covered under NH Site 301.18(i) which requires “*field studies be conducted under the same meteorological conditions as occurred at the time of the alleged exceedance that is the subject of the complaint.*” [Emphasis added] HMMH conducted a general post-construction noise monitoring survey without regard for the existing complaints. The report includes several pages of hub-height wind speed and direction but there is no point where HMMH identifies the meteorological conditions that it assumed incited the complaints or whether those conditions occurred at any time during the monitoring periods.

3. HMMH monitor locations do not comply with NH Site 301.14(f)(2). HMMH states that the selected monitor sites were “near homes in the vicinity of the wind farm ... at locations representative of the affected residential areas.”⁷ This statement does not satisfy the plain language of NH Site 301.14(f)(2).

NH Site 301.14(f)(2) establishes the turbine noise limit that cannot be exceeded when measured “*on property that is used in whole or in part for permanent or temporary residential purposes, at a location between the nearest building on the property used for such purposes and the closest wind turbine.*” [Emphasis added] None of the locations selected by HMMH meet this requirement.

Each of the complaints filed with the NH SEC involves homes situated well under 1 mile from the nearest turbine.⁸ In all cases one or more turbines were within the direct line-of-sight of the nearest residential building on the property.

⁵ This contrasts with Acentech’s seasonal sound surveys where substantial turbine sound data were excluded in violation of ANSI/ASA S12.9-2013/Part 3. See Acentech Post Construction Sound Monitoring Report – Winter 2020 at 19.

⁶ NH SEC Order Appointing the Committee April 2, 2021 at 2.

⁷ Report at 2

⁸ HMMH discarded sound data collected at the NHDOT facility as not useful and replaced it with the Loverens Mill Road site. No noise complaints have been filed from Loverens Mill Road or other properties on the North side of the highly trafficked Route 9. Monitoring at Loverens Mill Road provides no useful information for the purposes of complaint validation.

Address	Approx. distance to nearest turbine
362 Keene Road	2,770 feet
72 Reed Carr Road	3,670 feet
80 Reed Carr Road	3,800 feet
88 Reed Carr Road	3,800 feet
156 Salmon Brook Road	3,800 feet

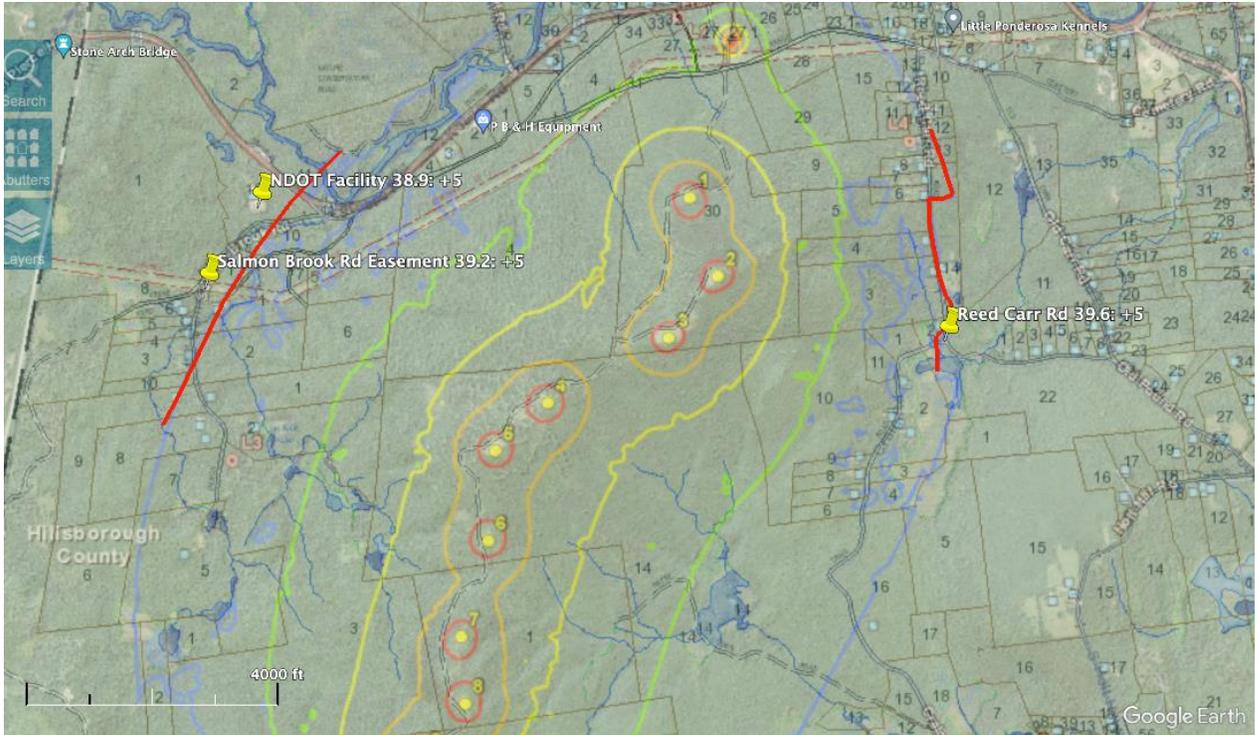
Table 3 of the report shows that HMMH’s monitor locations were placed well over 4,000 feet from each of the turbines and in most cases well over a mile with just two exceptions: the Reed Carr Road monitor near turbine #02 and the Craig Road site near turbine #03. As previously stated, the report provides no photographic evidence of the monitor locations and no information indicating a line-of-sight between the monitor and any of the turbines.

Since noise attenuates with distance, data collected at the HMMH-selected monitor locations could not represent the conditions experienced by the complaints.

- HMMH data show turbines exceeded predicted levels.** HMMH’s field measurements at Reed Carr Road and Salmon Brook Road show sound levels over 41 dBA and 39 dBA $L_{eq}(5\text{-minute})$ respectively. Despite increased averaging in the $L_{eq}(elapsed\ time)$ levels, HMMH still recorded turbine noise around 39 dBA. *Significantly, these actual measurements represent a material increase over what the facility’s sound model predicted for worst-case conditions at the same locations.*⁹

The worst-case sound levels (dBA) predicted for Antrim Wind are shown in the attached image taken from the 2016 sound assessment report. The bright green contour represents the predicted 40 dBA limit meaning that turbine sounds outside the green contour are expected to be lower than 40 decibels at all times. The blue contour represents the predicted 35 dBA mark.

⁹ Antrim Wind Energy Project Sound Level Assessment Report, 2/17/2016 at 7-6.
https://www.nhsec.nh.gov/projects/2015-02/application/documents/2015-02_2016-02-19_att09_updated_noise_rpt.pdf



Credit Robert W. Rand, Member ASA, INCE (Member Emeritus), Rand Acoustics, LLC.

Comparing HMMH’s field measurements at Reed Carr Road and Salmon Brook Road to the worst-case predicted values shows that the preconstruction model underpredicted project sound levels by as much as 5 dB.

In effect, the blue contour line more accurately represents the 40 dBA sound level meaning homes *inside the blue contour* are likely experiencing levels over 40 dBA. This point is captured visually in the figure above where the red lines are overlaid on the original blue contour. Hub-height wind speeds and turbine output levels during these measurement periods show that the project was not operating under worst-case conditions.

5. **HMMH data show turbines producing low power.** The Antrim facility is composed of nine Siemens SWT-3.2-113, with a nameplate capacity of 3.2 megawatts each. This information is important in understanding whether the turbines were generating at levels that could cause offending sound emissions during any of the measurement periods.

HMMH asserts that the Antrim turbines were operating during all reported measurement periods and “were audible during all reported (non-excluded) periods.”¹⁰ This statement is not supported by HMMH’s data. HMMH’s Tables 19 and 20 show that in the mid-day and early evening periods of June 30, hub-height wind speeds were at or below the turbine cut-in speed and the turbines were largely not generating. This is further reflected by the low decibel readings during these periods which were in the mid-20 dBA range.

¹⁰ Report at 4

Table 20 also shows that 70% of the time the turbines were operating at less than half power (1600 kilowatts). This is confirmed by the hub-height wind speeds posted in Table 19.

For the July 1 monitoring period where HMMH states the turbines were generating at a high level but causing relatively low period average L_{eq} sound levels,¹¹ HMMH omits that many of the turbines were still operating at low power levels. For example, at Salmon Brook Road, the $L_{eq}(5\text{-minute})$ levels reported in Table 15 correspond to the period when turbines T1, T3, T4, T6, and T9 were operating at, or well under 50% output. Similarly, at Craig Road the $L_{eq}(5\text{-minute})$ levels reported in Table 17 correspond to the period when turbines T3, T6, and T9 operated at, or well under 50% output.

- 6. Monitoring on private property.** The subcommittee's August 31, 2022 quarterly report states that "[c]omplainants have not provided access to their properties for the Subcommittee's independent expert, HMMH, to conduct sound measurements."¹² HMMH repeats this claim in its report.¹³ These statements misrepresent the record. Any attempt to blame neighbors to the Antrim turbines for problems with the HMMH study would be misplaced.

In their written response to the subcommittee's quarterly report, Barbara Berwick and Janice Longgood stated their express desire for sound testing to be done on their properties. As part of that testing process, they asked to be fully informed about the method that HMMH would follow and to have an opportunity to ask and get answers to specific questions.¹⁴ The subcommittee refused their simple request leaving Ms. Berwick and Ms. Longgood uncomfortable about granting access.

CONCLUSION

HMMH generally followed the ANSI standard in measuring and processing turbine-only sound levels but failed to comply with NH Site 301.14(f)(2) or 301.18(i). Nonetheless, when HMMH's measurements were evaluated in the context of a post-construction sound compliance test, they showed that the turbines were producing much louder sound levels on Reed Carr Road and Salmon Brook Road than predicted. Most of the noise complaints filed with the state are by homeowners on these two roads.

The louder sound measurements were taken when the turbines were producing below worst-case levels.¹⁵ It stands to reason that the facility at higher power outputs is exceeding the night noise limit at multiple residential properties closer to the turbines than where HMMH measured.

Contrary to HMMH's conclusion that Antrim Wind is compliant with the NH SEC sound limit, HMMH's own data clearly demonstrate that the facility is exceeding the nighttime noise limit and potentially the daytime limit.

Given the seriousness of this matter, the impact of this study on all parties, and the significant time and cost allocated to date, I trust the subcommittee will take the issues raised in this letter seriously and act

¹¹Report at 5

¹²https://www.nhsec.nh.gov/projects/2021-02/documents/2021-02_letter2goldner.pdf

¹³*Id.* at 1

¹⁴Ms. Berwick's and Ms. Longgood's letter includes the full email thread with the subcommittee on this matter. https://www.nhsec.nh.gov/projects/2021-02/documents/2021-02_public_comment_berwick_longgood.pdf

¹⁵Antrim Wind Energy Project Sound Level Assessment Report, 2/17/2016 at 7-3.

expeditiously to resolve the pending complaints. I will be present at the May 15 meeting. If you have any questions in the interim, I welcome hearing from you at lisa@linowes.com or by phone at (603)838-6588.

Respectfully,

A handwritten signature in black ink, appearing to be 'Lisa Linowes', with a stylized flourish at the end.

Lisa Linowes
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Lyman, NH 03585
603-838-6588

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